PATENT COOPERATION TREATY

PCT

INTERNATIONAL PRELIMINARY REPORT ON PATENTABILITY

(Chapter II of the Patent Cooperation Treaty)

(PCT Article 36 and Rule 70)

Applicant's or agent's file reference 47376	**FOR FURTHER ACTION**	See Form PCT/IPEA/416
International application No. PCT/IT2004/000370	International filing date *(day/month/year)* 02.07.2004	Priority date *(day/month/year)* 04.07.2003
International Patent Classification (IPC) or national classification and IPC B65H45/20, B65H33/18		
Applicant FABIO PERINI S.P.A. et al.		

1. This report is the international preliminary examination report, established by this International Preliminary Examining Authority under Article 35 and transmitted to the applicant according to Article 36.
2. This REPORT consists of a total of 5 sheets, including this cover sheet.
3. This report is also accompanied by ANNEXES, comprising:
   a. ☒ *sent to the applicant and to the International Bureau)* a total of 4 sheets, as follows:
      ☐ sheets of the description, claims and/or drawings which have been amended and are the basis of this report and/or sheets containing rectifications authorized by this Authority (see Rule 70.16 and Section 607 of the Administrative Instructions).
      ☐ sheets which supersede earlier sheets, but which this Authority considers contain an amendment that goes beyond the disclosure in the international application as filed, as indicated in item 4 of Box No. I and the Supplemental Box.
   b. ☐ *(sent to the International Bureau only)* a total of (indicate type and number of electronic carrier(s)) , containing a sequence listing and/or tables related thereto, in computer readable form only, as indicated in the Supplemental Box Relating to Sequence Listing (see Section 802 of the Administrative Instructions).

4. This report contains indications relating to the following items:

☒	Box No. I	Basis of the opinion
☐	Box No. II	Priority
☐	Box No. III	Non-establishment of opinion with regard to novelty, inventive step and industrial applicability
☐	Box No. IV	Lack of unity of invention
☒	Box No. V	Reasoned statement under Article 35(2) with regard to novelty, inventive step or industrial applicability; citations and explanations supporting such statement
☐	Box No. VI	Certain documents cited
☒	Box No. VII	Certain defects in the international application
☐	Box No. VIII	Certain observations on the international application

Date of submission of the demand	Date of completion of this report
19.01.2005	11.04.2005
Name and mailing address of the international preliminary examining authority: European Patent Office D-80298 Munich Tel. +49 89 2399 - 0 Tx: 523656 epmu d Fax: +49 89 2399 - 4465	Authorized Officer Hannam, M Telephone No. +49 89 2399-2153

INTERNATIONAL PRELIMINARY REPORT ON PATENTABILITY

International application No.
PCT/IT2004/000370

Box No. I Basis of the report

1. With regard to the **language**, this report is based on the international application in the language in which it was filed, unless otherwise indicated under this item.

   ☐ This report is based on translations from the original language into the following language , which is the language of a translation furnished for the purposes of:
   - ☐ international search (under Rules 12.3 and 23.1(b))
   - ☐ publication of the international application (under Rule 12.4)
   - ☐ international preliminary examination (under Rules 55.2 and/or 55.3)

2. With regard to the **elements*** of the international application, this report is based on *(replacement sheets which have been furnished to the receiving Office in response to an invitation under Article 14 are referred to in this report as "originally filed" and are not annexed to this report)*:

Description, Pages	
1-12	as originally filed
Claims, Numbers	
1-20	received on 19.01.2005 with letter of 14.01.2005
Drawings, Sheets	
1/5-5/5	as originally filed

   ☐ a sequence listing and/or any related table(s) - see Supplemental Box Relating to Sequence Listing

3. ☐ The amendments have resulted in the cancellation of:
   - ☐ the description, pages
   - ☐ the claims, Nos.
   - ☐ the drawings, sheets/figs
   - ☐ the sequence listing *(specify)*:
   - ☐ any table(s) related to sequence listing *(specify)*:

4. ☐ This report has been established as if (some of) the amendments annexed to this report and listed below had not been made, since they have been considered to go beyond the disclosure as filed, as indicated in the Supplemental Box (Rule 70.2(c)).
   - ☐ the description, pages
   - ☐ the claims, Nos.
   - ☐ the drawings, sheets/figs
   - ☐ the sequence listing *(specify)*:
   - ☐ any table(s) related to sequence listing *(specify)*:

* *If item 4 applies, some or all of these sheets may be marked "superseded."*

Box No. V Reasoned statement under Article 35(2) with regard to novelty, inventive step or industrial applicability; citations and explanations supporting such statement

1. Statement

Novelty (N)	Yes:	Claims	1-20
	No:	Claims	
Inventive step (IS)	Yes:	Claims	1-20
	No:	Claims	
Industrial applicability (IA)	Yes:	Claims	1-20
	No:	Claims	

2. Citations and explanations (Rule 70.7):

see separate sheet

Box No. VII Certain defects in the international application

The following defects in the form or contents of the international application have been noted:

see separate sheet

Reference is made to the following document:

D1: EP-A-0 294 675

Item V

Claim 1

Document D1, considered to represent the closest prior art for the present invention, discloses a folding machine essentially as per the preamble of the present independent claim 1. The subject matter of this claim differs from that disclosed in D1 in that the tracks carrying the separating fingers extend inside the annular groove of the respective folding roller.

The subject matter of claim 1 is thus new (Article 33(2) PCT).

The objective technical problem being solved by this difference may be seen as how to increase the operating speed of such a folding machine.

The solution presented in the characterising portion of claim 1 cannot be found in, nor is it rendered obvious by, the available prior art. The track extending inside the annular groove of the associated folding roller enables the track to get closer to the nip between the folding rollers which in turn enables the separating fingers to extract a folded web portion from the folding rollers more quickly than would otherwise be possible. This increased extraction speed enables more folding members to be placed on each folding roll that would otherwise be possible (4 rather than 2 for example), thus increasing the operating speed.

The subject matter of claim 1 is thus inventive (Article 33(3) PCT).

Claims 2-20

Being dependent on claim 1, these claims equally meet the requirements of Article 33 PCT.

Item VII

Contrary to the requirements of Rule 5.1(a)(ii) PCT, the relevant background art disclosed in the document D1 is not mentioned in the description, nor is this document identified therein.

Amendments under Art. 34 PCT

Amended CLAIMS

1. A folding machine including: a pair of folding rollers (1, 3) rotating about axes essentially parallel to each other and defining a nip (5) through which a web material (N) to be folded passes, disposed on each of which are folding members (61, 61A; 63, 63A) which form folds on said web material parallel to the axis of rotation of the folding rollers; and, for each of said folding rollers (1, 3), a transferring device (11, 13) to transfer packs of products folded by the folding rollers towards an unloading area (9), which transfer device includes a plurality of separating fingers (15) movable along a closed path, from an area of engagement with the folded products to an unloading area of the folded products; wherein said closed path is defined by a track (19), said separating fingers sliding inside and projecting from said track, and wherein each folding roller is provided with an annular groove (1G; 3G) into which said separating fingers project; characterized in that each of said tracks (19) of said transferring devices extends inside the annular groove (1G, 3G) of the respective folding roller (1, 3).

2. Folding machine according to claim 1, characterized in that each finger 15 is equipped with a shaped guide base (17) sliding in said track (19), and that said shaped guide bases enter the annular groove (1G, 3G) of the respective folding roller (1, 3) when moving along said track.

3. Folding machine as claimed in claim 1 or 2, characterized in that ~~on each of said folding rollers at least one folding gripper (61; 63)~~ is provided, oscillating about an axis (C) parallel to the axis of rotation of the respective folding roller (1; 3), interrupted at the level of said annular groove (1G; 3G).

4. Folding machine as claimed in claim 1 or 2 or 3, characterized in that on each of said folding rollers at least two folding members (61, 63) are provided.

5. Folding machine as claimed in claim 3 or 4, characterized in that each of said folding grippers (61, 63) is equipped with an oscillating control shaft (65), which has an elbow configuration (65G) at the level of the annular groove (1G, 3G), the transferring device (11; 13) interfering with the axis of

oscillation (C) of said control shaft (65).

6. Folding machine as claimed in one or more of the previous claims, characterized in that each transferring device includes a sliding track (19) defining said closed path for said separating fingers (15), which extend approximately orthogonal to said track and have respective guide bases (17) engaging slidingly in said track (19); the track having an essentially rectilinear forward section (19A), extending from the folding rollers (1, 3) to said unloading area (9) of the packs of products, and a return section; said forward and return sections being connected by a first curvilinear end portion (19C), adjacent to the folding rollers (1, 3) and a second curvilinear end portion (19D), adjacent to the unloading area (9), the first curvilinear end portion (19C) intersecting the cylindrical surface of the respective folding roller (1; 3).

7. Folding machine as claimed in one or more of the previous claims, characterized in that each of said transferring devices comprises a continuous flexible member (21) to convey the separating fingers along said closed path.

8. Folding machine as claimed in claims 6 and 7, characterized in that said flexible member (21) cooperates with the guide bases (17) of the respective fingers (15).

9. Folding machine as claimed in claim 6 or 7, characterized in that said flexible member (21) is inside the closed path followed by the guide bases (17) of said fingers, remaining constrained in the vertical space of said guide bases (17).

10. Folding machine as claimed in claim 9, characterized in that said flexible member acts on a surface of said guide bases (17) facing the inside of the closed path defined by said track (19).

11. Folding machine as claimed in one or more of claims 6 to 10, characterized in that a rotating inserting member (41) is associated with the first curvilinear end portion (19C) of said track (19), to pick up the separating fingers (15) from the return section (19B) of said track and insert them in the forward section (19A) of said track, making said fingers travel along the corresponding curvilinear end portion (19C) of said track.

12. Folding machine as claimed in claim 11, characterized in that

said rotating inserting member (41) penetrates said annular groove (1G; 3G) in the corresponding folding roller (1; 3).

13. Folding machine as claimed in claims 7 and 11, characterized in that along a terminal part of the return section of the track (19) and along part of the first curvilinear end portion (19C) of said track (19) the separating fingers (15) are not in contact with said flexible conveying member (21).

14. Folding machine as claimed in claim 13, characterized in that said flexible member (21) is driven around a first guiding wheel (23) associated with said rotating inserting member (41), the axis of rotation (B) of the first guiding wheel and the axis of rotation (A) of the rotating inserting member (41) being parallel and eccentric.

15. Folding machine as claimed in claim 14, characterized in that the eccentricity of said axes of rotation of the first guiding wheel (23) of the flexible member (21) and of the rotating inserting member (41), the diameter of said first guiding wheel and the diameter of the first curvilinear end portion (19C) of the track (19) of the separating fingers, are arranged and dimensioned so that the bases of the inserting fingers are not in contact with the flexible member for an angle ranging from approximately 90° to approximately 160° of the first curvilinear end portion (19C) of the track (19), the fingers (15) being brought into contact with the flexible member (21) by the rotating inserting member (41) at the end of said first curvilinear end portion of the track.

16. Folding machine as claimed in claim 14 or 15, characterized in that said first guiding wheel is at least partially inside said annular groove (1G; 3G) in the respective folding roller.

17. Folding machine as claimed in claim 16, characterized in that said rotating inserting member (41) is controlled by means of a driving wheel (43) meshing with it, positioned on the outside of said annular groove (1G; 3G).

18. Folding machine as claimed in one or more of claims 7 to 17, characterized in that said continuous flexible member (21) is a belt comprising a base layer (21A) and a shaped coating (21B), cooperating with corresponding slots (17A) in the bases (17) of the separator fingers (15).

19. Folding machine as claimed in one or more of claims 6 to 18,

characterized in that a rotating sprocket (53) is disposed at the level of said second curvilinear end portion (19D) of the track (19) of the separating fingers (15), to pick up the fingers from the forward rectilinear section (19A) and transfer them to the return section (19B) of said track (19).

20. Folding machine as claimed in claims 7 and 19, characterized in that at the level of said second curvilinear end portion (19D) the continuous flexible member is not in contact with the bases of the separating fingers.